APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/697,010	10/31/2003	Ramon Vega	200209963-1	8251

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EXAMINER
ZHU, RICHARD Z

ART UNIT	PAPER NUMBER
2625	

NOTIFICATION DATE	DELIVERY MODE
08/27/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

JERRY.SHORMA@HP.COM
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-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS,
WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed
  after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any
  earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on <u>04 August 2008</u>.

2a) ☐ This action is FINAL.   2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is
closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) <u>1-4,6-14 and 16-20</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) <u>1-4, 6-14, and 16-20</u> is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

        1. ☐ Certified copies of the priority documents have been received.

        2. ☐ Certified copies of the priority documents have been received in Application No. _____.

        3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage
            application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under, including the fee set forth in 37 CFR

    1.17(e), was filed in this application after final rejection. Since this application is eligible

    for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e)

    has been timely paid, the finality of the previous Office action has been withdrawn

    pursuant to 37 CFR 1.114. Applicant's submission filed on 08/04/2008 has been

    entered.

Status of the Amendment

2. Claims 1 and 11 are currently amended, Claims 5 and 15 are canceled, and Claims 1-4, 6-14,

    and 16-20 are pending in the instant application.

Response to Applicant's Arguments

3. Applicant's arguments have been fully considered but are moot in view of the new grounds

    of rejections.

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness

rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in
> section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are
> such that the subject matter as a whole would have been obvious at the time the invention was made to a person
> having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the
> manner in which the invention was made.

5. Claims 1-4, 6-8, 10-14, 16, and 18-20 are rejected under 35 USC 103(a) as being

unpatentable over *Maruyama et al. (US 6871934 B2)* in view of *Girones et al. (US 6238112*

B1).

Regarding Claim 1, *Maruyama* discloses a method of operating a printer of the kind

comprising an array of dot printing elements extending in a first direction relative to a page

to be printed and which prints at least a part of the page during relative movement between

the array and the page in a second direction at an angle to the first direction (**Col 4, Rows 45-**

65, a printhead comprising a plurality of nozzles moved in the main scanning direction

and the paper medium being moved relative to the nozzles in the sub-scanning

direction), the array comprising a plurality of groups of elements with redundancy among

the elements of the group (**Col 5, Rows 16-35, different nozzles are used to print different**

dots), the method comprising, in respect of at least one of said groups, initially commencing

printing using a subset of the elements in the group (**Col 5, Rows 30-35, keeping a subset of**

nozzles out of use when printing is first commenced) and, during the course of printing,

increasing the number of elements available to print in the group (**Fig 4, and see Col 5,**

Rows 58 – Col 6, Row 20);

wherein each element newly made available to the group is initially made available
for use less frequently than the existing element(s) **(Fig 4, for example Scan Pass N+I,
nozzles 1-4 had already been used 5 times when nozzles 5-7 are used only once**).

The limitation "wherein each element newly made available to the group is initially
made available for use less frequently than the existing element(s)" as broadly interpreted,
merely calls for elements newly made available for printing to be used less frequently than
the existing elements, which is necessarily true for any nozzle that is newly introduced whose
frequency of use so far is comparatively less than that of the nozzles that has already been in
use. Applicant's remark on Page 9 is ambiguous in so far that it does not specified the
difference between applicant's claimed invention and the prior art of record.

However, in the interest of compact prosecution and in reciprocation of the act of
good faith and effort at clarifying the subject matter as demonstrated by the applicant, the
examiner is reading the applicant's disclosure into the claimed limitation to recite "wherein
each element newly made available to the group is initially assigned a frequency of firing
inks that is lesser than an existing frequency of firing inks assigned to the existing elements,
in at least a subsequent pass of printing employing both the newly made available element
and the existing elements".

Hence, *Masuyama* does not teach wherein each element newly made available to the
group is initially assigned a frequency of firing inks that is lesser than an existing frequency
of firing inks assigned to the existing elements, in at least a subsequent pass of printing
employing both the newly made available element and the existing elements.

Girones discloses a printer with at least one printhead comprising a plurality of nozzles (**Col 9, Rows 18-34**) with redundancy (**Col 26, Rows 31-37**) having a method of printing comprising:

performing a plurality of drop tests throughout the course of printing a single plot to determine the latest health status of the plurality of nozzles (**Col 16, Rows 20-54 and see Col 17-18, various scores and indicia indicating the health status of nozzles**);

determine, on the basis of the latest health status of the plurality of nozzles, a probability that each nozzle would work through out the course of printing (**Fig 3 and see Col 25, Rows 5-45, the value of probability changes through out the course of printing after each drop detecting test, Col 25, Rows 40-44**) ;

wherein the process of printing comprising:

commence printing with a group or subset of nozzles initially (**Col 26, Rows 30-37**);

continue printing with a subsequent subset of nozzles made newly available to the group for use in a subsequent pass of the printing (**Col 26, Rows 38-52**);

throughout said process of printing, design and otherwise update a printmask that sets the frequency of fire for each nozzle within the group on the basis of the health status of the nozzles employed in the printing process (**Col 26, Rows 53-60 and Rows 65-67**) after each drop test (**Col 24, Rows 5-15, the process of "error hiding"**);

wherein if it is determined that any element or nozzle made newly available for subsequent pass of printing has a lower probability of working than nozzles within the

current group, it is initially set to a frequency of firing that is lower than the frequency of

firing of nozzles with higher probabilities of working **(Col 27, Table 7, initial printmask,**

Col 28, Table 9, updated printmask, and see Col 27-28, the process for designing a

updated printmask, the lower frequency of firing being zero).

It would've been obvious to one of ordinary skill in the art at the time of the invention

to modify the apparatus of *Masuyama* with the hardwares and softwares to implement the

drop detection test, nozzle health status determination, work probability calculations, and

printmask designing as taught by *Girones* so as to adaptively assign workload and frequency

of firing to nozzles newly introduced in a subsequent pass of printing on the basis of its latest

health status whereas the motivation would've been to provide a printer with error hiding

capability that ensures minimum acceptable printing quality in the event that any printhead

nozzle is determined to be in a state of failure or with a high probability of failure (*Girones*,

Col 24, Rows 1-14).

Regarding Claim 2, *Maruyama* discloses wherein each redundant group is arranged

to print a respective row of dots in the second direction **(Col 5, Rows 15-35, multi-pass**

printing assigns a fraction of a the total amount of nozzles to print a respective portion

of an image or rows of dots in the direction in which the printhead is conveyed. See

***Girones,* Col 26, Rows 31-37).**

Regarding Claim 3, *Maruyama* discloses wherein the number of elements in the

group available to print is increased as a function of the distance traveled by the array **(Col 6,**

Rows 1-20, number of elements newly available is a function of cumulative distance

traveled because individual groups of elements are assigned to print portions of an
image or respective rows of dots wherein the more the cumulative distance traveled,
more elements are made newly available).

Regarding Claim 4, *Maruyama* discloses wherein the number of elements in the
group available to print is increased as a function of the number of firing pulses sent to the
elements of the group (**Col 5, Rows 1-10, it is well known that firing pulses or signals are
needed to command nozzles to eject ink. See for example, *Girones,* Col 14, Rows 14-16**).

Regarding Claim 6, *Maruyama* discloses wherein at least one element in the group
is serviced prior to printing so that it is at least partially operational at the commencement of
the print job, printing being commenced using the said at least one serviced element and one
non-serviced element (**Col 6, Rows 1-20, preparing the nozzles identified for printing in a
first pass for printing while nozzles identified for printing in a second pass is not service
yet**),

Maruyama as modified by *Girones* discloses the limitation that the non-serviced
element initially being made available for use less frequently than the said at least one
serviced element (**Fig 11 and see Col 19, Rows 1-30. See also Col 18, Rows 57-65. The
disclosure as best understood by the examiner teaches a scenario where a nozzle out of
a subset of nozzles newly made available in a second pass of printing is determined to
have a lower probability of working than other nozzles. At this time, said nozzle has not
been service yet. A printmask is generated such that said nozzle is set to a frequency of
firing inks that is lower than other nozzles with higher probability of working in order**

to implement error hiding and servicing as taught by the disclosure cited above is
performed in parallel or in sequence to the generation of printmask).

Regarding Claim 7, *Maruyama* discloses prior to commencing printing, identifying
portions of the array of printing elements which will be needed at least for a first pass of the
array relative to the first page of the print job, and servicing printing elements according to
the array portions so identified whereby one or more printing elements outside the identified
array portions are not serviced (**Col 6, Rows 1-20, identifying a subset of nozzles for a first
printing pass and perform preliminary service on said nozzles only**).

Regarding Claim 8, *Girones* discloses wherein faulty printing elements, as identified
by a faulty printing element database, are excluded from being made available to the group
(**Fig 11, Step 1130 and see Col 19, Rows 22-30 and see Col 17, Rows 40-45, nozzles
identified as permanent defect are excluded from being service and hence from ever
being assign a frequency of firing ink in any subsequent modification of printmask**).

Regarding Claim 10, *Maruyama* discloses wherein the printer is an inkjet printer
and the dot printing elements are inkjet nozzles (**Col 4, Rows 45-65**).

Regarding Claim 11, *Maruyama* discloses an incremental printer (**Figs 1-2**)
comprising a plurality of printing elements grouped into redundant groups, each group being
arranged to print substantially different portions of a given page of a printjob (**Col 5, Rows
10-35, multi-pass printing where different nozzles are used to print different dots**), the
incremental printer being adapted, when commencing a printjob, to control at least one
redundant group of printing elements such that only a subset of the printing elements in that

group are used to print (**Col 5, Rows 30-35, keeping a subset of nozzles out of use when printing is first commenced**), the incremental printer being further arranged to subsequently increase the number of printing elements in that group which are used to print (**Fig 4, and see Col 5, Rows 58 – Col 6, Row 20**);

the printer being further arranged, when increasing the number of printing elements in subset of that group, to cause the one or more printing elements newly included in the subset to print for a predetermined duration at a frequency lower than that of one or more printing elements previously included in the subset (**Fig 4, for example Scan Pass N+1, nozzles 1-4 had already been used 5 times when nozzles 5-7 are used only once**).

Similar to Claim 1, the examiner is reading the disclosure into the claim to recite "wherein each element newly made available to the group is initially assigned a frequency of firing inks that is lesser than an existing frequency of firing inks assigned to the existing elements, in at least a subsequent pass of printing employing both the newly made available element and the existing elements".

Hence, *Masuyama* does not teach wherein each element newly made available to the group is initially assigned a frequency of firing inks that is lesser than an existing frequency of firing inks assigned to the existing elements, in at least a subsequent pass of printing employing both the newly made available element and the existing elements.

Girones discloses a printer with at least one printhead comprising a plurality of nozzles (**Col 9, Rows 18-34**) with redundancy (**Col 26, Rows 31-37**) having a method of printing comprising:

performing a plurality of drop tests throughout the course of printing a single plot to determine the latest health status of the plurality of nozzles (**Col 16, Rows 20-54 and see Col 17-18, various scores and indicia indicating the health status of nozzles**);

determine, on the basis of the latest health status of the plurality of nozzles, a probability that each nozzle would work through out the course of printing (**Fig 3 and see Col 25, Rows 5-45, the value of probability changes through out the course of printing after each drop detecting test, Col 25, Rows 40-44**) ;

wherein the process of printing comprising:

commence printing with a group or subset of nozzles initially (**Col 26, Rows 30-37**);

continue printing with a subsequent subset of nozzles made newly available to the group for use in a subsequent pass of the printing (**Col 26, Rows 38-52**);

throughout said process of printing, design and otherwise update a printmask that sets the frequency of fire for each nozzle within the group on the basis of the health status of the nozzles employed in the printing process (**Col 26, Rows 53-60 and Rows 65-67**) after each drop test (**Col 24, Rows 5-15, the process of "error hiding"**);

wherein if it is determined that any element or nozzle made newly available for subsequent pass of printing has a lower probability of working than nozzles within the current group, it is initially set to a frequency of firing that is lower than the frequency of firing of nozzles with higher probabilities of working (**Col 27, Table 7, initial printmask,**

Col 28, Table 9, updated printmask, and see Col 27-28, the process for designing a

updated printmask, the lower frequency of firing being zero).

It would've been obvious to one of ordinary skill in the art at the time of the invention

to modify the apparatus of *Masuyama* with the hardwares and softwares to implement the

drop detection test, nozzle health status determination, work probability calculations, and

printmask designing as taught by *Girones* so as to adaptively assign workload and frequency

of firing to nozzles newly introduced in a subsequent pass of printing on the basis of its latest

health status whereas the motivation would've been to provide a printer with error hiding

capability that ensures minimum acceptable printing quality in the event that any printhead

nozzle is determined to be in a state of failure or with a high probability of failure (*Girones*,

Col 24, Rows 1-14).

Regarding Claim 12, *Maruyama* discloses wherein each redundant group is

arranged to print a row or column of image data (Col 5, Rows 15-35, multi-pass printing

assigns a fraction of the total amount of nozzles to print a respective portion of an

image or rows of dots in the direction in which the printhead is conveyed. See *Girones*,

Col 26, Rows 31-37).

Regarding Claim 13, *Maruyama* discloses wherein the elements are arranged to

move relative to the image being printed and the number of elements in the subset of that

group is increased in dependence upon the degree of movement between the elements and the

image being printed (Col 6, Rows 1-20, number of elements newly available is a function

of cumulative distance traveled because individual groups of elements are assigned to

print portions of an image or respective rows of dots wherein the more the cumulative

distance traveled or the amount of movement, more elements are made newly

available).

      Regarding Claim 14, *Maruyama* discloses wherein the number of elements in the

subset of that group is increased in dependence upon the cumulative number of firing pulses

sent to the elements of the group during the printing of the printjob (**Col 5, Rows 1-10, it is

well known that firing pulses or signals are needed to command nozzles to eject ink. See

for example, *Girones,* Col 14, Rows 14-16**).

      Regarding Claim 16, *Maruyama* discloses wherein at least one element in that

group is serviced prior to commencing the printjob (**Col 6, Rows 1-20, preparing the

nozzles identified for printing in a first pass for printing while nozzles identified for

printing in a second pass is not service yet**).

      Regarding Claim 18, *Maruyama* discloses wherein the printer is an inkjet printer

and the printing elements are inkjet nozzles (**Col 4, Rows 45-65**).

      Regarding Claim 19, *Girones* discloses a printer control circuit adapted to control a

printer to perform the method claimed in claim 1 (**Col 14, Rows 15-16, print head driver

device**).

      Regarding Claim 20, *Girones* discloses a computer readable medium containing

program instruction which, when executed by a data processing device, control a printer to

perform the method claimed in claim 1 (**Col 14, Rows 18-22, algorithms implemented as

programmed instructions stored in hardware memory**).

6.   Claims 9 and 17 are rejected under 35 USC 103(a) as being unpatentable over the combined

teachings of *Maruyama et al. (US 6871934 B2)* and *Girones et al. (US 6238112 B1)* in view

of *Audi et al. (US 6705697 B2)*.

   Regarding Claims 9 and 17, the combined teachings do not disclose wherein the

array of printing elements extends substantially fully across the page in the first direction.

   Audi discloses incremental printer **(Fig 7)** comprising a plurality of printing elements

grouped into redundant groups **(Col 3, Rows 52-65)**, each group being arranged to print

substantially different portions of a given page of a printjob **(Col 4, Row 60 – Col 5, Row**

5), the incremental printer being adapted, when commencing a printjob, to control at least

one redundant group of printing elements such that only a subset of the printing elements in

that group are used to print **(Col 5, Rows 30-35, keeping a subset of nozzles out of use**

when printing is first commenced), the incremental printer being further arranged to

subsequently increase the number of printing elements in that group which are used to print

(Col 7, Rows 25-40, offset or incremental printing; assign a first subset of nozzles to

print a different scanline relative to a second subset of nozzles, see Col 6, Rows 34-38);

   wherein the plurality of printing elements form a page wide or a page high array or

the array of printing elements extends substantially fully across the page in the first direction

(Col 3, Rows 60-65, page width nozzle array).

   It would've been obvious to one of ordinary skill in the art at the time of the invention

to modify the structure of the combined teachings with the page width nozzle array

configuration of *Audi* whereas the motivation would've been to provide "a page width

printer controller that is operable to achieve collinear page width printing for use with a

continuously moving recording medium that avoids at least some of the cost associated with

reconfiguration of" printing raster data (***Audi*, Col 2, Rows 43-47**).

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's

disclosure: US 4664542 A, US 5729257 A, and US 6951378 B1 discloses printing apparatus

that employs a first subset of nozzles with less frequency relative to another subsets of

nozzles in order to properly cool the printhead down. US 6557971 B1, US 6601935 B2, and

US 6779873 B2 disclose designing printmasks to distribute print workload.

Any inquiry concerning this communication or earlier communications from the

examiner should be directed to examiner Richard Z. Zhu whose telephone number is 571-

270-1587 or examiner's supervisor King Y. Poon whose telephone number is 571-272-7440.

Examiner Richard Zhu can normally be reached on Monday through Thursday, 6:30 - 5:00.

Information regarding the status of an application may be obtained from the Patent

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(toll-free). If you would like assistance from a USPTO Customer Service Representative or

access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or

571-272-1000.

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08/19/2008   Assistant Examiner
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